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Naval Surface Weapons Center

— 29 SEPT 75 —



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U. S. NAVAL PROVING GROUND  
DAHLGREN, VIRGINIA

REGISTERED MAIL

REPORT NO. 1001

3359313

WARHEADS FOR AIR TARGET GUIDED MISSILES;  
TESTING OF

47th Partial Report

ROD-EXPPELLING WARHEAD NO. 138;  
FRAGMENTATION TEST OF

FINAL Report

Task

Assignment NP6-Re3f-607-1-62

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54 AF-65677

Rod-expelling Warhead No. 138; Fragmentation Test of  
-----PART ASYNOPSIS

1. This test was conducted to obtain the fragment mass distribution of Rod-expelling Warhead No. 138. This warhead has a 4-3/8" diameter, 12" length, 0.0500 wall thickness, and is designed to produce 24 rods.

2. a. Warhead No. 138 produced 21 rod-like fragments which were 10"-12" in length and averaged 292 grams in weight. Only 10 of the 21 were of design length, 12". Three other rods were 7"-10" in length.

b. Of the three warheads with similar external dimensions and variable wall thickness tested to date, only Warhead No. 134, which had a wall thickness uniform over the center 4" of length and tapered to each end, produced 24 design length (12") rods. These rods averaged 331 grams each.

## Rod-expelling Warhead No. 138; Fragmentation Test of

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## Rod-expelling Warhead No. 138; Fragmentation Test of

PART BINTRODUCTION

## 1. AUTHORITY:

This test was authorized by reference (a) and conducted under Task Assignment NPG-Re3f-607-1-52, reference (b).

## 2. REFERENCES:

- a. NOL Conf Work Request WG/15/52 of 5 March 1952
- b. BUORD Conf ltr NP9 Re3f-EJHL:edb Ser 25777 of 18 September 1951
- c. NPG Conf Report No. 847 of 1 September 1951
- d. NPG Conf Report No. 972 of 5 May 1952

## 3. BACKGROUND:

a. Reference (b) authorized the Naval Proving Ground to work directly with the Naval Ordnance Laboratory in the development and testing of warheads for guided missiles.

b. References (c) and (d) reported the fragment mass distribution tests of rod-expelling warheads No. 120 and No. 134 respectively. These warheads were 4-3/8" diameter, 12" long, and of wall thicknesses which were less at the ends than at the center. Warhead No. 138, which is the subject of this test, has the same external dimensions and the same internal grooving as warheads Nos. 120 and 134 but has a uniform wall thickness of 0.500, which gives essentially the same total charge-to-metal weight ratio as calculated for warhead No. 120.

## 4. OBJECT OF TEST:

This test was conducted to obtain the fragment mass distribution of Rod-expelling Warhead No. 138. This warhead has a 4-3/8" diameter, 12" length, 0.500 wall thickness, and is designed to produce 24 rods.

## 5. PERIOD OF TEST:

- |                                     |               |
|-------------------------------------|---------------|
| a. Date Project Letter              | 5 March 1952  |
| b. Date Necessary Material Received | 11 March 1952 |
| c. Date Commenced Test              | 31 March 1952 |
| d. Test Completed                   | 31 March 1952 |



## Rod-expelling Warhead No. 138; Fragmentation Test of

PART CDETAILS OF TEST

## 6. DESCRIPTION OF ITEM UNDER TEST:

Warhead No. 138, rod-expelling, cylindrical, mild steel tubing, 4.375 diameter, 12.00 long uniform, 0.500 wall thickness, contains 24 internal longitudinal grooves 0.063 wide and 0.400 deep, empty weight 19.18 lbs., Composition 6-3 weight 6.31 lbs., total weight 25.49 lbs. The warhead was initiated by a 26 gram tetryl booster and a special engineers blasting cap at one end.

## 7. PROCEDURE:

The warhead was supported on its side in a cane fiberboard box which was surrounded by sawdust in the Fragmentation Chamber. The fragments were collected in the sawdust and separated using a 1/4" mesh screen and a magnetic separator.

## 8. RESULTS AND DISCUSSION:

a. Detailed mass distribution data are shown in Figure 2 and listed in Table I and are summarized as follows:

<u>Warhead No.</u>	<u>No. of Rod in Length Groups</u>		
	<u>12"</u> <u>(Design Size)</u>	<u>10"-12"</u>	<u>7"-10"</u>
138	10	11	3
*134	24	0	0
*120	20	0	4

\* References (c) and (d).

The 21 rod-like fragments which were 10" to 12" in length averaged approximately 292 grams in weight. Only 10 rods were of design length, 12".

b. Of the three similar warheads, Nos. 120, 134, and 138, Warhead No. 134 which had a uniform thickness at its center 4" of length and uniform tapering to both ends, was the most satisfactory in that it produced all rods of design length with an average weight of 331 grams, reference (d).

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Rod-expelling Warhead No. 138; Fragmentation Test of

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PART D

CONCLUSIONS

9. a. Warhead No. 138 produced 21 rod-like fragments which were 10"-12" in length and averaged 292 grams in weight. Only 10 of the 21 were of design length, 12". Three other rods were 7"-10" in length.

b. Of the three warheads with similar external dimensions and variable wall thickness tested to date, only Warhead No. 134, which had a wall thickness uniform over the center 4" of length and tapered to each end, produced 24 design length (12") rods. These rods averaged 331 grams each. Detailed data are reported in reference (d).

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Rod-expelling Warhead No. 138; Fragmentation Test of  
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The tests upon which this report is based were conducted by:

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Terminal Ballistics Department

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Captain, USN  
Ordnance Officer  
By direction

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U. S. NAVAL PROVING GROUND  
DAHLGREN, VIRGINIA

Forty-Seventh Partial Report

on

Warheads for Air Target Guided Missiles;

Testing of

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Final Report

on

Rod-expelling Warhead No. 138;

Fragmentation Test of

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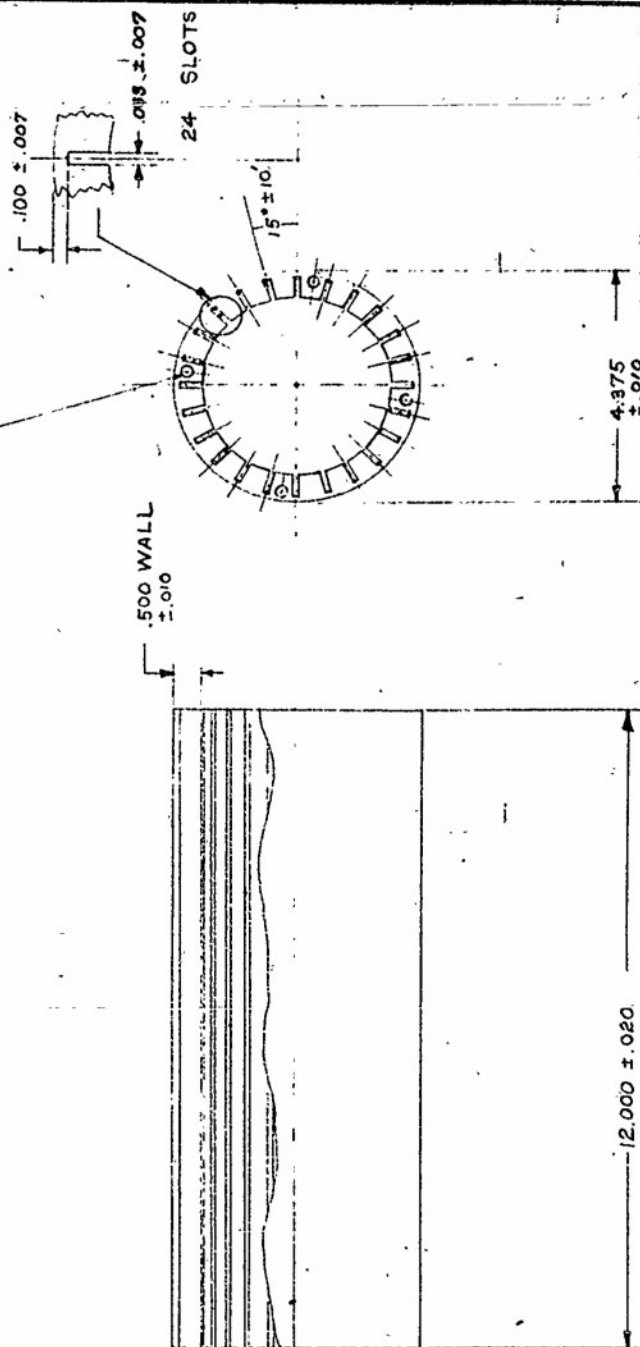
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SK 350579

NO. 8-32 NC-2 DRILLED & TAPPED TO 563  
DEEP 4 HOLES LOCATED 90° APART ON  
3.953 DIA. HALFWAY BETWEEN SLOTS



REVISIONS		
SYM	DESCRIPTION	DATE

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TRIAL WARHEAD  
138

SCALE 1/2  
UNIT: WT.  
JOB ORDER

APPROVED		18
BY SIGNATURE OF THE COMMANDER		
CHECKED	DRAWN	NJS
		5-6-52

USING ATTENTION SPECIFIED  
REMOVE BURRS AND SHARP EDGES.  
DIMENSIONS ARE IN INCHES  
UNLESS OTHERWISE SPECIFIED  
DECIMALS 2  
DO NOT SCALE THIS DRAWING  
MATERIAL MILD STEEL  
TURNING  
SPECIFICATIONS OF LATEST ISSUE APPLY

NEXT ASSY USED ON  
APPLICATION

FRAG NO. 1650

NOL WARHEAD NO 138

N.P. 48909

0-1/2	Gms.	
472	PCS.	
1/2-1 1/4	Gms.	
74	PCS.	
64	Gms.	
1 1/4-2 1/4	Gms.	
44	PCS.	
76	Gms.	
2 1/4-5	Gms.	
43	PCS.	
143	Gms.	
5-10	Gms.	
7	PCS.	
40	Gms.	
10-20	Gms.	
1	PCS.	
14	Gms.	
20-40	Gms.	
9	PCS.	
301	Gms.	
40-80	Gms.	
4	PCS.	
212	Gms.	
80-160	Gms.	
2	PCS.	
272	Gms.	
160-320	Gms.	
22	PCS.	
6080	Gms.	

320-640 Gms.  
2 Pcs.  
666 Gms.

SCALE 1"

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Fragment of Warhead No. 138.  
Page 2

TABLE I

MASS DISTRIBUTION DATA

FRAGMENTATION OF ROD-EXPPELLING WARHEAD NO. 138, COMP. C-3 LOADED																										
NUMBER AND WEIGHT OF RECOVERED FRAGMENTS																										
Rd. No.	Comp. Wt. lb.	Faller Wt. lbs.	0-0.625		0.625-1.25		1.25-2.5		2.5-5		5-10		10-20		20-40		40-80		80-160		160-320		320-640		Total Wt. Gms.	Photo No. NP2
			grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.		
1	25.49	6.131	472	64	74	76	44	143	43	40	7	14	1	301	9	212	4	272	2	6080	22	666	2	8340	208	48909

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